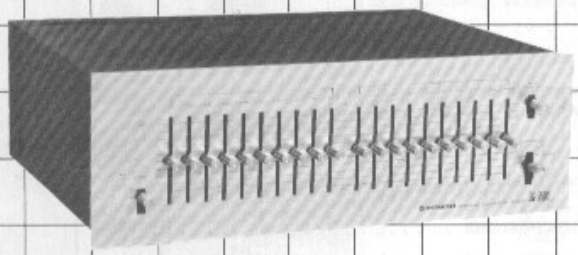
GRAPHIC EQUALIZER

SG-9500

OPERATING INSTRUCTIONS

KC
KU



IMPORTANT NOTICE

The serial number for this equipment is located on the rear panel. Please write this serial number on your enclosed warranty card and keep in a secure area. This is for your security.

PIONEER

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

FEATURES

Op Amp Filter Circuits

Operational amplifier (Op Amp) integrated circuits make up the special active filter networks for each band. Performance is always stable, while the complete elimination of coils avoids aging variations due to temperature, humidity and other ambient conditions. The high dynamic range design provides low distortion over a wide band with respect to any input signal.

2 Channel 10 Element Graphic Equalizer

The graphic equalizer divides the audio frequency spectrum into 10 segments from 32 Hz to 16 kHz, each segment corresponding to an octave. Individual controls for each segment provide continuous adjustment (from −10 dB to +10 dB) and allow the sound to be contoured in order to compensate for equipment and speaker characteristics, listening room acoustics or personal preferences. Adjustments can also be performed during recording.

Effective Tape Monitor and Equalizer Switches

Tape jacks are included for connecting a stereo tape deck. In addition to input signal equalizing, simple switch selection can provide equalizing for a tape playback signal and recording of an equalized signal.

Easily Interpreted Panel Design

Slide controls and lever switches compose the operating panel. The styling is both functional and attractive, making this an excellent addition to a high performance audio system in combination with Pioneer audio components.

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CONNECTIONS

STEREO SYSTEM

For the purpose of these Operating Instructions, the term "stereo system" refers specifically to the main control unit of the system. According to the type of system, this may be a stereo receiver, an integrated stereo amplifier, or the preamplifier in the case of a separate preamplifier-power amplifier system.

- Connect the tape recording jacks (TAPE REC) of the stereo system to the INPUT jacks of the SG-9500.
- Connect the tape playback jacks (TAPE PLAY) of the stereo system to the OUTPUT jacks of the SG-9500.

TAPE DECK

A stereo tape deck can be connected for equalized recording of the program source and equalized playback of the tape signal.

Recording Connections

Connect the TAPE REC jacks of the SG-9500 with the recording jacks (LINE INPUT) of the tape deck.

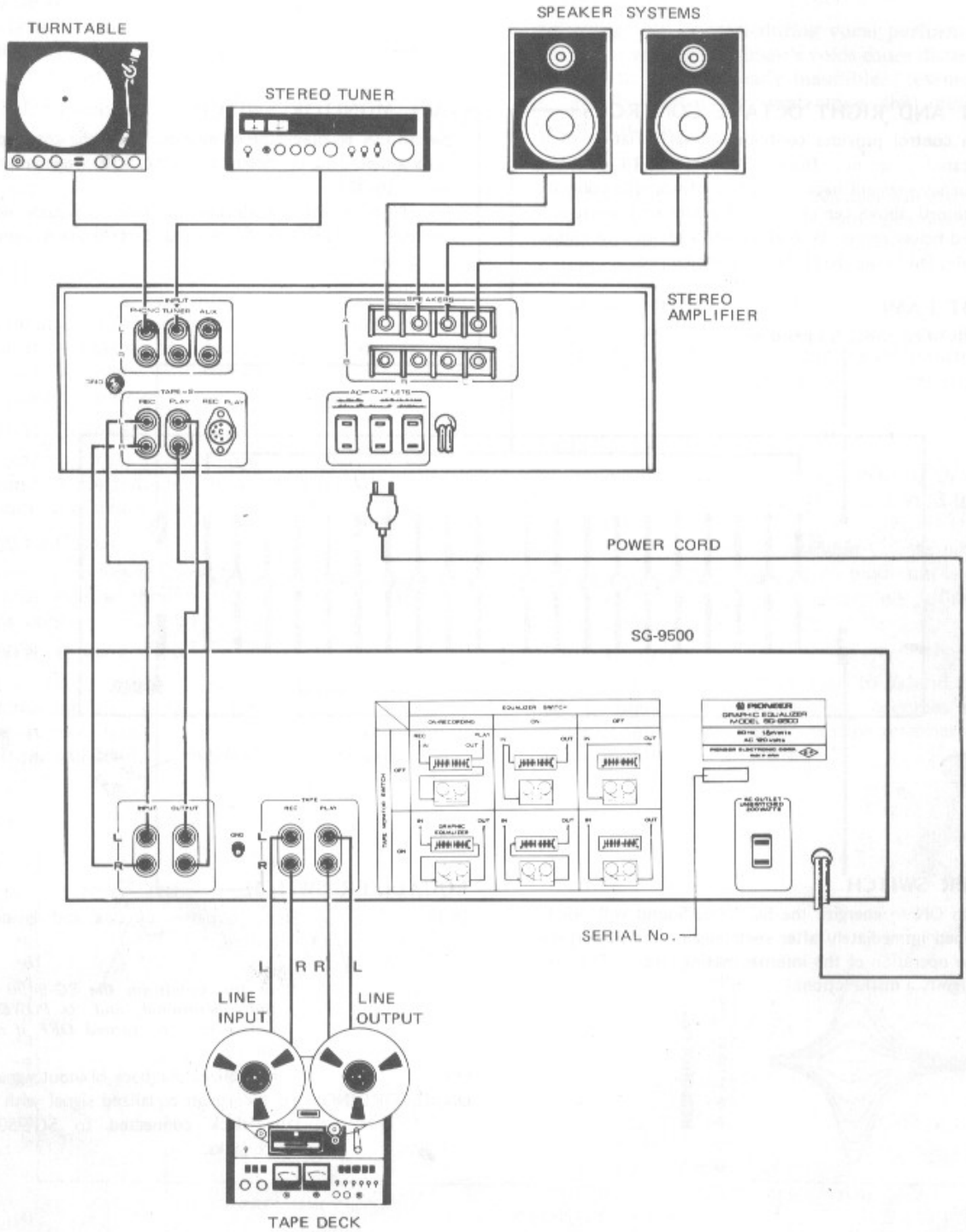
Playback Connections

Connect the TAPE PLAY jacks of the SG-9500 with the playback jacks (LINE OUTPUT) of the tape deck.

NOTES:

- *All upper jacks of the SG-9500 are for the left (L) channel and lower jacks for the right (R) channel. Take care to connect corresponding channels (L to L and R to R).*
- *Make connections carefully, as faulty connections can lead to noise or loss of sound.*

CONNECTION DIAGRAM



FRONT PANEL FACILITIES

LEFT AND RIGHT OCTAVE CONTROLS

Each control provides continuous level variation of its indicated frequency from −10 dB to +10 dB. Each frequency segment becomes enhanced when its control is positioned above center (0) and attenuated when positioned below center. With all controls set to 0, the input signal is fed to the OUTPUT jacks unchanged.

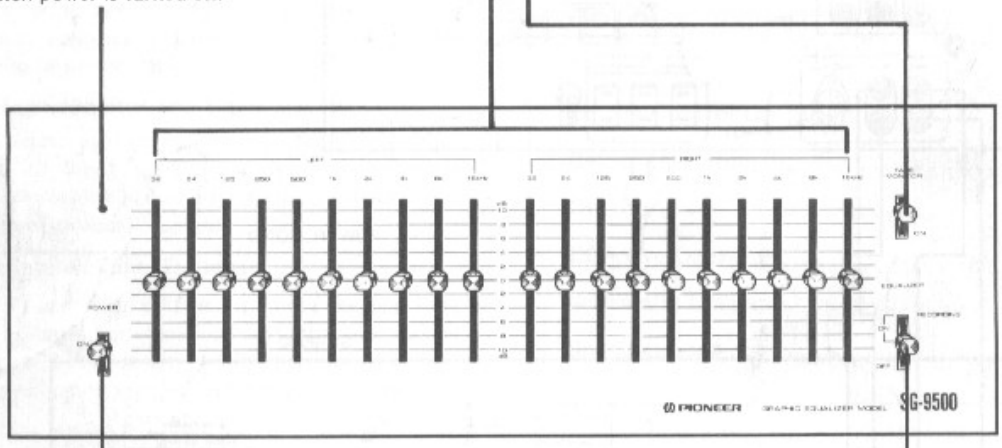
PILOT LAMP

Lights when power is turned on.

TAPE MONITOR SWITCH

Set to ON to play tape or monitor recording conditions with a tape deck connected to the SG-9500. Normally set switch to OFF.

See Page 6 for description of tape playback with combined TAPE MONITOR and EQUALIZER switch operation.



POWER SWITCH

Set to ON to energize the SG-9500. Sound will not be obtained immediately after switching on the power, due to the operation of the internal muting circuit. This does not signify a malfunction.

EQUALIZER SWITCH

OFF: Signal bypasses circuits and is not equalized.

Note

In this condition the SG-9500 is not operational, and its POWER switch may be turned OFF if required.

ON: For equalized playback of input signal.

ON/RECORDING: To record an equalized signal with a tape deck connected to SG-9500 TAPE jacks.

OCTAVE CONTROL OPERATION

As shown in Fig. 1, each octave control adjusts only in a narrow band with the center frequency as indicated above the control. Adjust the controls according to conditions or personal preferences.

32 Hz Control:

This can be used to compensate for excessively strong low frequency output from the speaker system, or as a low cut filter to reduce motor rumble, record cutting noise and similar low frequency noise.

64 Hz Control:

Increasing this control setting brings out the fascination of massive bass sounds such as produced by bass violins, drums and pipe organs. The sound is given an impression of solidness and imposing grandeur.

125 Hz Control:

Enhancing this region imparts a fullness to the sound, while reducing the control setting provides a more transparent sound.

250 Hz Control:

Clapping causes echo reflections in certain types of rooms, such as those adjacent to hallways. Reduce this control setting to eliminate these reflections.

500 Hz Control:

This region governs the strength of the sound. Increasing the control setting can add impact to the sound, while conversely, an excessively low setting can lend an impression of incompleteness.

1 kHz Control:

Adjusting this control during vocal performances can either render the singer's voice more distinct or cause it to become nearly inaudible. Presence can be greatly varied by controlling the midrange sound frequency.

2 kHz Control:

Sound in the 2 kHz area provides the strongest stimulus to the human ear and also evokes a psychological response. If the sound has a hard, metallic impression, reduce this control.

4 kHz Control:

When set too high, the sound can become irritatingly brassy and metallic. Setting the control for attenuation can result in a gentle, non-fatiguing sound for easy listening.

8 kHz Control:

Increasing this control setting enhances the brilliance of music containing string and wind instruments. If a conventional type tone control is used to increase this band, undesirable effects may be imparted and the sound can be made unpleasant. The 8 kHz frequency band delicately influences tone variations.

16 kHz Control:

The 16 kHz control can be used to extend subtle high frequencies. Sound presence becomes richer with instruments possessing narrow reverberations such as cymbals and triangle.

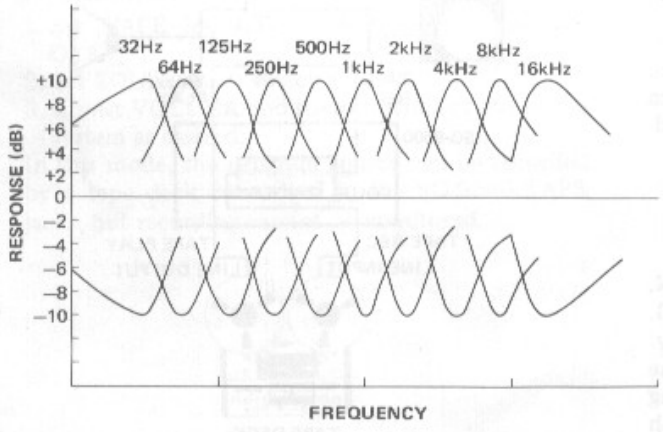


Fig. 1 Octave Control Variation Curve

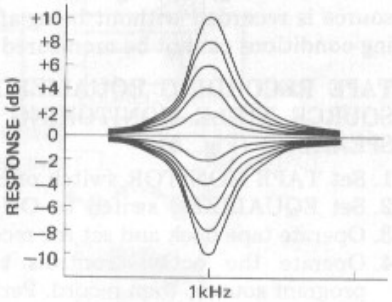


Fig. 2 1 kHz Variation Response

BEFORE OPERATING

It is suggested to plug the SG-9500 power cord into a switched convenience outlet of the stereo system. The POWER switch of the SG-9500 can then be left in the ON position and power to the unit supplied by operating the power switch of the stereo system.

- Set the TAPE MONITOR switch of the stereo system to ON.
- Operate stereo system tone controls and set for flat response.
- Set LOUDNESS switch of stereo system to OFF.

OPERATION

EQUALIZING PROGRAM SOURCE (Fig. 3)

1. Adjust VOLUME control of the stereo system as desired.
2. Set TAPE MONITOR switch of SG-9500 to OFF.
3. Set EQUALIZER switch to ON.
4. Operate octave controls to obtain equalization.
5. Readjust VOLUME control of the stereo system.

In this mode, the unequalized program source will be recorded by a tape deck connected to the SG-9500 TAPE jacks and recording conditions cannot be monitored.

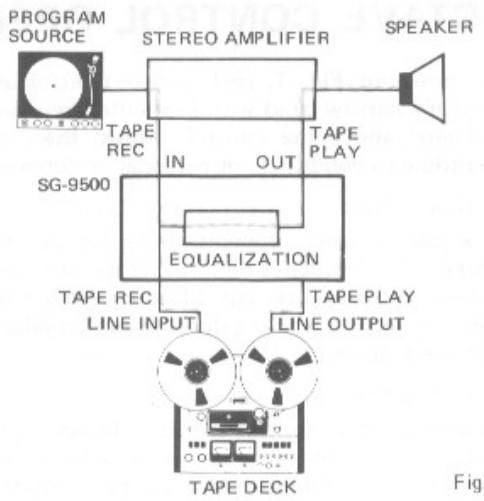


Fig. 3

EQUALIZING TAPE PLAYBACK SIGNAL (Fig. 4)

1. Set TAPE MONITOR switch of SG-9500 to ON.
2. Set EQUALIZER switch to ON.
3. Operate tape deck and play tape.
4. Adjust VOLUME control of stereo system as desired.
5. Operate octave controls to obtain equalization.
6. Readjust VOLUME control of the stereo system.

When recording, the original sound of the program source is recorded without being affected. Recording conditions cannot be monitored at this time.

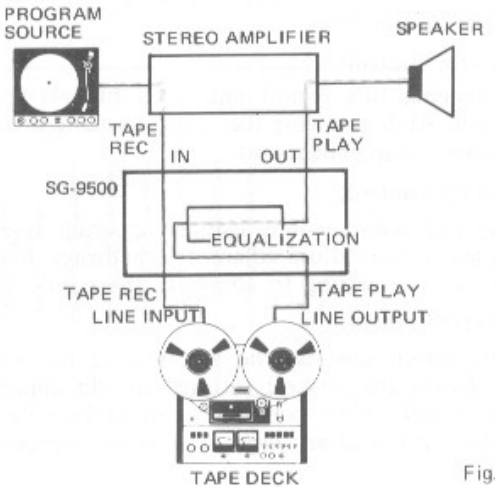


Fig. 4

TAPE RECORDING EQUALIZED PROGRAM SOURCE WHILE MONITORING WITH SPEAKERS (Fig. 5)

1. Set TAPE MONITOR switch of SG-9500 to ON.
2. Set EQUALIZER switch to ON/RECORDING.
3. Operate tape deck and set for recording standby.
4. Operate the octave controls to equalize the program source, then record. Perform equalizing while monitoring the recording conditions with the speakers.

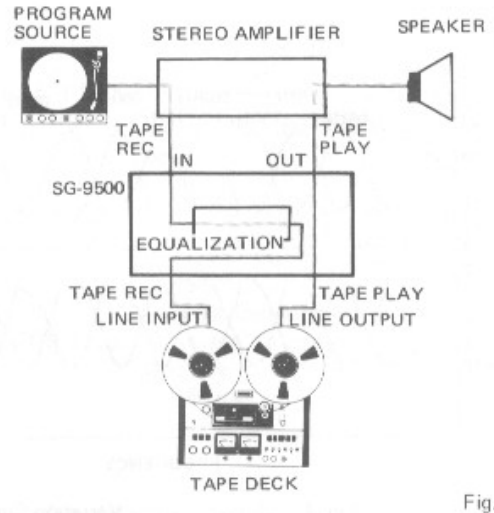


Fig. 5

- Note that due to the variation in human ear response according to volume (loudness response), the equalizing effect recorded on tape and the sound monitored from the speakers can differ.
- In this mode, the tape playback signal cannot be equalized.

EQUALIZING PROGRAM SOURCE WHILE SIMULTANEOUSLY LISTENING WITH SPEAKERS AND RECORDING ON TAPE (Fig. 6)

1. Set TAPE MONITOR switch of SG-9500 to OFF.
2. Set EQUALIZER switch to ON/RECORDING.
3. Adjust VOLUME control of stereo system as desired.
4. Operate tape deck and set for recording standby.
5. Operate the octave controls to perform equalization.
6. Readjust the VOLUME control of the stereo system and proceed with recording.

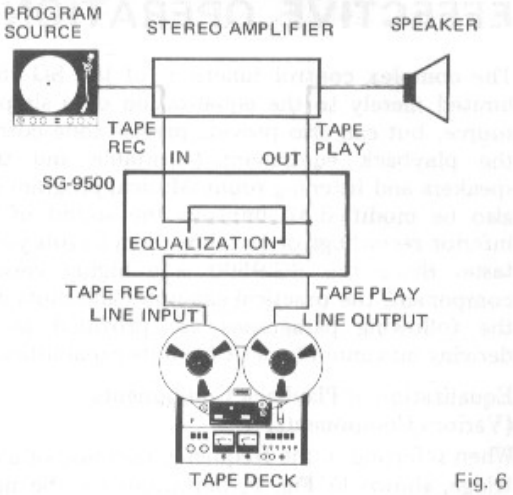


Fig. 6

TAPE RECORDING OR PLAYBACK WITHOUT EQUALIZING THE PROGRAM SOURCE (Fig. 7)

1. Set TAPE MONITOR switch of the SG-9500 to ON.
2. Set EQUALIZER switch to OFF.
3. Operate tape recorder to record program source or play a tape.

If recording in this mode, recording conditions can be monitored through the speakers.

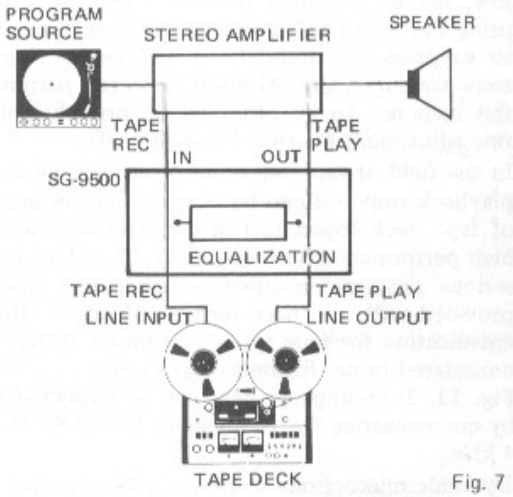


Fig. 7

PLAYING PROGRAM SOURCE WITHOUT EQUALIZATION (Fig. 8)

1. Set TAPE MONITOR switch of SG-9500 to OFF.
2. Set EQUALIZER switch to OFF.
3. Adjust VOLUME and tone controls of the stereo system as desired.

In this mode, the program source can be recorded by a tape deck connected to the SG-9500 TAPE jacks, but recording cannot be monitored.

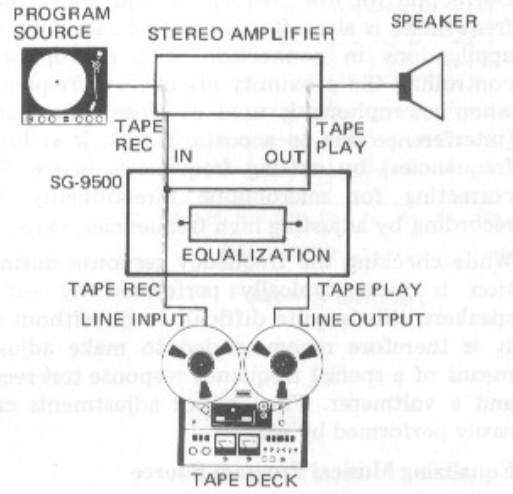


Fig. 8

EFFECTIVE OPERATION

The complex control functions of the SG-9500 are not limited merely to the equalization of a simple program source, but can also provide precise tone corrections for the playback equipment (turntable and tape deck), speakers and listening room. Musical program sources can also be modified to improve the sound of technically inferior recordings or to tailor them to suit your personal taste. Since the SG-9500 is a highly versatile audio component, the practical examples and hints described in the following paragraphs are provided as an aid to deriving maximum benefit from its capabilities.

Equalization of Playback Components (Various Components)

When referring to the frequency response of a typical cartridge, shown in Fig. 9, deviations can be noted in the low, middle and high frequency regions. Compensation using the tone controls of an ordinary amplifier still fails to suppress the undulations and peaks (Fig. 9) in the response curve; the SG-9500, however, permits an overall flat response to be obtained by providing independent fine adjustment for each band (Fig. 10).

In the field of tape recording, considerable differences in playback response can be observed according to the type of tape deck (open reel or cassette) and tape (standard, high performance, chrome, etc.). This does not present a serious problem in practice, since the tape decks are provided with the necessary equalization. However, full equalization for tape types plus maker differences can be considered quite difficult. An example of this is shown in Fig. 11. Tone improvement can be expected in this case by compensating for frequencies below 64 Hz and above 4 kHz.

Dynamic microphone response is exemplified in Fig. 12. Correction for low frequencies and above medium high frequencies is also effective in this case. Other important applications in connection with microphones include controlling the proximity effect (low frequency increase when microphone is used at close range) and howling (interference due to acoustic feedback at low and high frequencies) by cutting frequencies below 64 Hz, plus correcting for microphone directionality during live recording by adjusting high frequencies. (Figs. 11 and 12)

While checking the frequency response during equalization is most typically performed by ear from the speakers, this is quite difficult to do without experience. It is therefore recommended to make adjustments by means of a special frequency response test record or tape and a voltmeter. Final minor adjustments can then be easily performed by ear.

Equalizing Musical Program Source

The sound quality of recorded music is often ascribed to

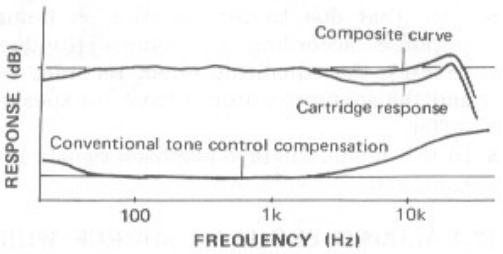


Fig. 9 MM cartridge high frequency compensation with conventional tone controls

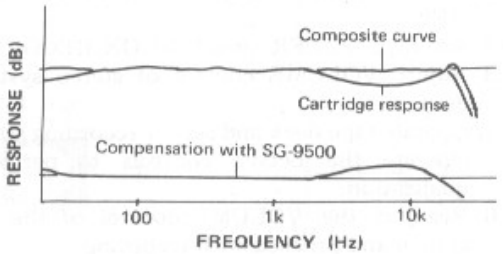


Fig. 10 MM cartridge high frequency compensation with SG-9500

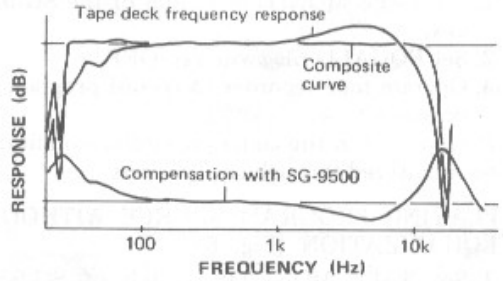


Fig. 11 Example of tape deck frequency response

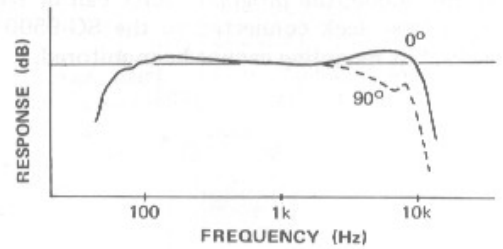


Fig. 12 Example of dynamic microphone response

the personal taste of the studio mixing engineer. To some extent this is true, since the mood of a recording can be varied by such effects as echoes and emphasis of particular instruments, factors which are controlled by the mixing engineer. The SG-9500 can equalize many of these effects at the time of reproduction and allows you to compose the sound according to your personal taste.
To bring out the bass violins and drums, emphasize the frequencies below 250 Hz, for vocalists increase the area from 500 Hz — 2 kHz, for strings 4 kHz — 8 kHz, and for cymbals above 8 kHz. Control combinations are also important. For example, to emphasize low frequency bass violins, adjust not only the 250 Hz control but also vary the positions of the high frequency controls. A brilliant and rich sound can then be produced. Left and right channel controls can also be adjusted according to musical instrument positioning, a technique which may also enhance separation.

Compensation for Room Acoustics (Fig. 13)

Frequency characteristics of the listening room are subject to complex influences according to listening position. Sound reflections are generally a problem in rooms surrounded by hard walls. High and low frequencies become enhanced, while an impression of inadequacy may be felt in the lower midrange. Spurious reflections are also high in such rooms and tend to disturb sound orientation (musical instrument positions).
In this type of situation, first improve the conditions as far as possible by such standard techniques as installing a thick carpet on the floor and draperies opposite the speaker systems, and by careful selection and arrangement of the furniture. After determining the listening position, the SG-9500 can then be used to adjust for optimum system performance. Changes in characteristics can be considerable according to the location.
The reverse effect can be noted in an excessively dead room (sound reflectivity too low) which can impart an inadequate impression to low and midrange frequencies. Equalization for high frequencies (including speaker response) then becomes necessary.
Recommended test instruments for evaluating room and speaker system acoustic characteristics consist of a low frequency oscillator, a microphone and flat amplifier whose characteristics are known, and a voltmeter (high sensitivity AC voltmeter). Employ these to construct a dB scale as shown in the Fig. 14.
Since the SG-9500 controls are graduated in dB, equalization can easily be obtained by setting controls at values opposite of those obtained in the measurements. To check the efficacy of the tone adjustments (equalization), without disturbing the control settings, operate the EQUALIZER switch ON-OFF. A-B comparison can then be heard directly.

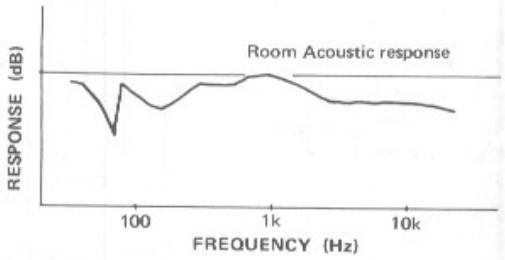


Fig. 13 Example of room acoustical response (transfer response)

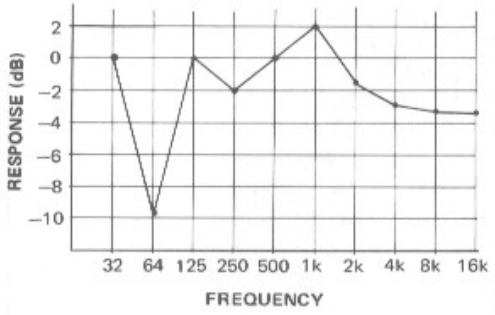


Fig. 14 Frequency line chart

SPECIFICATIONS

Semiconductors

ICs 14
FETs 2
Transistors 12
Diodes 13

Equalizer Section

Equalizer Range
(Individual channel adjust) ..... ±10dB,
32Hz, 64Hz, 125Hz, 250Hz, 500Hz,
1kHz, 2kHz, 4kHz, 8kHz, 16kHz

Total Harmonic Distortion
20Hz – 20kHz, All Control Flat Output 1V 0.04%
1kHz, All Control Max. Output 3V 0.04%
1kHz, All Control Flat Output 2V 0.03%
1kHz, All Control Min. Output 1V 0.05%
Insertion Loss ..... 0dB (Control Flat)
Max. Output Voltage
(1kHz, THD.: 0.05%, RL 47kΩ) 6V
Frequency Response ..... 5Hz – 70kHz $^{+0}_{-1}$dB
Signal to Noise Ratio
(IHF, A Network, short circuited, 2V Output) 90dB
Input Impedance 100kΩ
Output Impedance 600Ω

Miscellaneous

Power Requirements 120V/60Hz
Power Consumption 16watts
Dimensions ..... 420(W) x 150(H) x 341(D)mm
16-1/2 x 5-7/8 x 13-7/16in
Weight 6.9kg, 15lb 3oz

Furnished Parts

Connection Cord with Pin Plugs 2
Operating Instructions 1

NOTE:
Specifications and the design subject to possible modification without notice due to improvements.

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